

What Is Claimed Is:

1. A planarization method comprising:

positioning a Group VIII metal-containing surface of a substrate to interface  
5 with a fixed abrasive article, wherein the Group VIII metal is selected from the  
group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and  
combinations thereof;

supplying a planarization composition in proximity to the interface; and  
planarizing the substrate surface with the fixed abrasive article;

10 wherein the fixed abrasive article comprises a plurality of abrasive particles  
having a hardness of no greater than about 6.5 Mohs dispersed within a binder  
adhered to at least one surface of a backing material.

2. The method of claim 1 wherein the Group VIII metal-containing  
15 surface of the substrate has a nonplanar topography.

3. The method of claim 1 wherein the Group VIII metal-containing  
surface of the substrate comprises a Group VIII metal in elemental form or an alloy  
thereof.

20 4. The method of claim 3 wherein the Group VIII metal-containing surface  
comprises elemental platinum.

25 5. The method of claim 3 wherein the Group VIII metal-containing surface  
comprises a platinum alloy.

6. The method of claim 1 wherein the Group VIII metal is present in an amount  
of about 10 atomic percent or more.

7. The method of claim 6 wherein the Group VIII metal is present in an amount of about 20 atomic percent or more.

5 8. The method of claim 7 wherein the Group VIII metal is present in an amount of about 50 atomic percent or more.

9. The method of claim 1 wherein the substrate is a wafer.

10 10. The method of claim 1 wherein the plurality of abrasive particles comprise  $\text{CeO}_2$ ,  $\text{Y}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ , or mixtures thereof.

11. The method of claim 10 wherein a majority of the plurality of abrasive particles are  $\text{CeO}_2$  abrasive particles.

15 12. The method of claim 1 wherein the planarization composition comprises an oxidizing agent, a complexing agent, or mixtures thereof.

20 13. The method of claim 1 wherein the Group VIII metal-containing surface is removed relative to a dielectric layer at a selectivity ratio of at least about 10:1.

25 14. A planarization method comprising:  
 providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;  
 providing a fixed abrasive article;  
 providing a planarization composition at an interface between the at least one region of platinum-containing surface and the fixed abrasive article; and  
 planarizing the at least one region of platinum-containing surface with the fixed abrasive article;

wherein the fixed abrasive article comprises a plurality of abrasive particles having a hardness of no greater than about 6.5 Mohs dispersed within a binder adhered to at least one surface of a backing material.

5        15.     The method of claim 14 wherein the platinum-containing surface has a nonplanar topography.

10       16.     The method of claim 14 wherein the platinum is present in an amount of about 10 atomic percent or more.

15       17.     The method of claim 14 wherein the platinum-containing surface comprises elemental platinum.

20       18.     The method of claim 14 wherein the platinum-containing surface comprises a platinum alloy.

25       19.     The method of claim 14 wherein the substrate assembly is a wafer.

30       20.     The method of claim 14 wherein the plurality of abrasive particles comprise  $\text{CeO}_2$ ,  $\text{Y}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ , or mixtures thereof.

35       21.     The method of claim 20 wherein a majority of the plurality of abrasive particles are  $\text{CeO}_2$  abrasive particles.

40       22.     The method of claim 14 wherein the planarization composition comprises an oxidizing agent, a complexing agent, or mixtures thereof.

45       23.     The method of claim 14 wherein the Group VIII metal-containing surface is removed relative to an oxide layer at a selectivity ratio of at least about 10:1.

24. A planarization method comprising:  
providing a semiconductor substrate or substrate assembly including at least  
one region of a platinum-containing surface having a nonplanar topography;  
providing a fixed abrasive article;  
5 providing a planarization composition at an interface between the at least  
one region of platinum-containing surface and the fixed abrasive article; and  
planarizing the at least one region of platinum-containing surface with the  
fixed abrasive article;  
wherein the fixed abrasive article comprises a plurality of abrasive particles  
10 selected from the group of  $\text{CeO}_2$ ,  $\text{Y}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ , and combinations thereof.

25. A planarization method comprising:  
providing a semiconductor substrate or substrate assembly including at least  
one region of a platinum-containing surface having a nonplanar topography;  
15 providing a fixed abrasive article;  
providing a planarization composition at an interface between the at least  
one region of platinum-containing surface and the fixed abrasive article; and  
planarizing the at least one region of platinum-containing surface with the  
fixed abrasive article;  
20 wherein the fixed abrasive article comprises a plurality of  $\text{CeO}_2$  abrasive  
particles.

26. A planarization method comprising:  
providing a semiconductor substrate or substrate assembly including at least  
25 one region of a platinum-containing surface having a nonplanar topography;  
providing a fixed abrasive article;  
providing a planarization composition comprising an oxidizing agent, a  
complexing agent, or a combination thereof at an interface between the at least one  
region of platinum-containing surface and the fixed abrasive article; and

planarizing the at least one region of platinum-containing surface with the fixed abrasive article;

wherein the fixed abrasive article comprises a plurality of  $\text{CeO}_2$  abrasive particles.

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27. A planarization method for use in forming a capacitor or barrier layer:

providing a wafer having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

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positioning a first portion of a fixed abrasive article for contact with the platinum-containing layer;

providing a planarization composition in proximity to the contact between the fixed abrasive and the Group VIII metal-containing layer; and

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planarizing the platinum-containing layer with the fixed abrasive article;

wherein the fixed abrasive article comprises a plurality of abrasive particles having a hardness of no greater than about 6.5 Mohs dispersed within a binder adhered to at least one surface of a backing material.

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28. The method of claim 27 wherein the Group VIII metal-containing surface of the substrate comprises a Group VIII metal in elemental form or an alloy thereof.

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29. The method of claim 28 wherein the Group VIII metal-containing surface comprises elemental platinum.

30. The method of claim 27 wherein the Group VIII metal-containing surface comprises a platinum alloy.

31. The method of claim 27 wherein the Group VIII metal is present in an amount of about 10 atomic percent or more.

32. The method of claim 31 wherein the Group VIII metal is present in an amount of about 20 atomic percent or more.

33. The method of claim 32 wherein the Group VIII metal is present in an amount of about 50 atomic percent or more.

34. The method of claim 27 wherein the substrate is a wafer.

35. The method of claim 27 wherein the plurality of abrasive particles comprise  $\text{CeO}_2$ ,  $\text{Y}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ , or mixtures thereof.

36. The method of claim 35 wherein a majority of the plurality of abrasive particles are  $\text{CeO}_2$  abrasive particles.

37. The method of claim 27 wherein the planarization composition comprises an oxidizing agent, a complexing agent, or mixtures thereof.

38. The method of claim 27 wherein the Group VIII metal-containing surface is removed relative to an oxide layer at a selectivity ratio of at least about 10:1.